

ACCESSION #: 9312070158  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Brunswick Steam Electric Plant, Unit 1 PAGE: 1 OF 11

DOCKET NUMBER: 05000325

TITLE: Severe Winter Storm Results in Spurious ESF Actuations  
and a Loss of Offsite Power  
EVENT DATE: 03/13/93 LER #: 93-08-002 REPORT DATE: 11/24/93

OTHER FACILITIES INVOLVED: BNP Unit 2 DOCKET NO: 05000324

OPERATING MODE: 04 POWER LEVEL: 00

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:

50.73(a)(2)(iii)

50.73 (a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Steve F. Tabor, Regulatory COMPLIANCE: (919) 457-2178  
Compliance Specialist

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On March 13, 1993, beginning at 1425 hours, while Units 1 and 2 were in cold shutdown, spurious Emergency Safeguard Feature (ESF) system initiations occurred on each unit. The initiations were caused by on-site electrical distribution system voltage depressions. These depressions were due to the simultaneous loss of two of four Unit 1 and one of four Unit 2 incoming transmission lines. The loss of the transmission lines was caused by high winds resulting from a severe winter storm. High winds caused a wood pole H-frame transmission line structure to fall onto an adjacent transmission line. This resulted in the loss of two of the four off-site power sources to Unit 1. Failure of the support structure also caused deflection of crossing transmission lines resulting in the loss of one of four Unit 2 off-site power sources. The failed Unit 2 off-site power source was restored at 1622 hours. During the severe weather, from 1731 to approximately 2037 hours, voltage

fluctuations resulting from the loss of a third incoming line caused four additional Unit 1 ESF initiations. The third Unit 1 incoming line was restored at approximately 2155 hours. The remaining Unit 1 off-site lines were restored by March 14, 1993 at approximately 2026 hours. On March 16, 1993, as a result of the March 13 winter storm, a Loss of Off-site Power (LOOP) occurred due to excessive salt build-up on switchyard insulators. Supplement One to this LER provides the details of the Loop and updates the status of corrective actions addressed in the Corrective Action section. Supplement Two to this LER revises the corrective action regarding detection of salt deposits on switchyard components as addressed in Supplement One to this LER.

The cause classification for this event per the criteria of NUREG-1022 is C (external).

END OF ABSTRACT

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TITLE

Severe Winter Storm Results in Spurious ESF Actuations and a Loss of Off-site Power

INITIAL CONDITIONS

On March 12, 1993, at 1609 hours, the CP&L Corporate Meteorologist contacted the Brunswick Control Room and informed Operations of the potential for a severe storm. At 1250 hours, on March 13, 1993, the Corporate Meteorological Unit forecasted sustained high winds of 40 to 50 mph with gusts to 70 mph. Administrative Instruction (AI) 68 (Brunswick Nuclear Project Response to Severe Weather Warnings) was implemented based on the storm warning. Both Units 1 and 2 were in Cold Shutdown at the time of the severe weather. Unit 1 off-site power was being supplied to the plant by "backfeeding" through the Unit 1 Unit Auxiliary Transformer. Power to the Unit 1 "A" channel of the RPS was being supplied by the alternate source and consequently the Unit 1 RPS A channel Motor Generator Set was not in service. Unit 2 off-site power was being supplied through the Unit 2 Startup Auxiliary Transformer.

EVENT NARRATIVE

On March 13, 1993, at 1425 hours, a severe winter storm containing hourly average wind speeds in excess of 50 mph and wind gusts up to 100 mph caused one pole of a wooden two pole H-frame transmission line structure (structure #10) supporting the Brunswick Unit 1 - Jacksonville 230 KV

transmission line to fail by breaking at the groundline. The resultant loading from conductors and gale wind forces caused the structure's second pole break approximately two feet above groundline. The structure failure caused conductors to come in contact with conductors of the adjacent Brunswick Unit 1 - Castle Hayne East 230 KV transmission line. This resulted in a loss of two of the four Unit 1 off-site power sources.

The Brunswick Unit 1 - Jacksonville 230 KV transmission line crosses the Brunswick - Unit 2 Castle Hayne West 230 KV transmission line. The failure of structure 410 caused an overhead static ground wire to pull downward and into the phase conductors of the Brunswick Unit 2 - Castle Hayne West 230 KV transmission line resulting in the loss of one of the four Unit 2 off-site power sources.

The resulting voltage fluctuations on the on-site electrical distribution system caused the following Unit 1 and Unit 2 system initiations:

Unit 1:

A half Group 1 isolation (Main Steam Isolation Valves)

A half Group 2 isolation resulting in the closure of the Drywell Floor and Equipment Drain Inboard Isolation valves, 1-G16-F003 and 1-G16-F019

A half Group 3 isolation resulting in the de-energization of the Reactor Water Cleanup (RWCU) Inboard Isolation Valve, 1-G31-F001 (This valve de-energized and remained in the open position because its associated MCC breaker was racked out with the valve in the open position to support on-going valve maintenance.)

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A Group 6 isolation resulting in the isolation of the Containment Atmospheric Control (CAC) valves, Reactor Building ventilation isolation, and Standby Gas Treatment System (SGTS) initiation

A half Group 8 isolation resulting in the closure of the 1-E11-F009 valve and the loss of Shutdown Cooling

A half Group 10 isolation resulting in the closure of the Primary Containment Pneumatic Supply Valves - Division II only

A half scram of the Reactor Protection System (RPS) - "A" logic channel only

The loss of the RWCU System Filter Demineralizer and RWCU pump trip

Unit 2:

A Group 1 isolation (No MSIVs closed since the valves were in the closed position prior to the event.)

A Group 6 isolation resulting in the closure of the Containment Atmospheric Control (CAC) valves and an isolation of the Reactor Building Ventilation System

The generation of a SGTS start signal (The system did not start since the SGTS was under clearance prior to the event in support of maintenance activities.)

A Group 10 isolation resulting in the isolation of both divisions of the Primary Containment Pneumatic Supply Valves

2B RWCU pump trip

At 1429 hours, Unit 1 Shutdown Cooling was restored. During the four minutes Shutdown Cooling was isolated, no increase in the reactor coolant temperature was observed. At 1435 hours, an Unusual Event was declared as a precautionary measure due to the loss of three off-site power sources and to increase the state of readiness should other off-site power sources become inoperable during the storm.

By approximately 1515 hours, the Unit 2 equipment affected by the electrical system transients was restored to normal operation. By approximately 1615 hours, the affected Unit 1 equipment was restored to normal operation with the exception of the RWCU Filter Demineralizer which was secured off-line pending backwash.

At 1622 hours, the failed Unit 2 Castle Hayne West 230 KV off-site power source was restored.

At approximately 1730 hours, a third Unit 1 off-site power source, Unit 1 - Delco East, tripped momentarily. This momentary loss of the third Unit 1 off-site power source resulted in voltage fluctuations to the on-site electrical distribution system and the following system initiations:

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Unit 1 SGTS initiation

Unit 1 Reactor Building Ventilation system isolation

## Unit 1 Drywell Purge Fan Isolation

Actuation of the Unit 1 Battery Bus Ground Annunciator (This annunciator cleared immediately following the reclosing of the third Unit 1 off-site power source.)

## Actuation of the Unit 1 Main Transformer Trouble Annunciator

At 1755 hours, the Main Transformer Trouble annunciator was reset. The annunciator was initiated due to detection of an undervoltage condition. By 1810 hours, the affected equipment was restored to normal operation.

At 1948 hours, the Unit 1 - Delco East off-site power source tripped a second time resulting in on-site voltage fluctuations and the following system initiations:

A Group 1 isolation resulting in the closure of the Unit 1 Main Steam Isolation Valves

A half Group 6 isolation resulting in the closure of the Unit 1 CAC valves -  
- Division II only

A half Group 10 isolation resulting in the closure of the Unit 1 Primary Containment Pneumatic Supply Valves - Division II only

A half scram of the Unit 1 RPS ("A" logic channel)

At 1951 hours, the Unit 1 - Delco East off-site power source was restored. The affected Unit 1 equipment was restored to normal operation.

At 1957 hours, the Unit 1 - Delco East off-site power source tripped a third time resulting in the same actuations and isolations that occurred at 1949 hours with the exception of the closure of the MSIVs which had been left in the closed position from the previous isolation. During attempts to restore the Unit 1 - Delco East off-site power source, the Unit 1 - Delco East "A" bus 230 KV Control Breaker would not close to allow the plant to accept the incoming Unit 1 - Delco East power. The Brunswick 230 KV electrical system design is such that the Unit 1 - Delco East power source may be supplied to the plant via one of two buses, the Unit 1 - Delco East "A" which is the preferred bus, or the Unit 1 - Delco East "B". To support restoring the third lost power source to Unit 1, the Unit 1 - Delco East "B" bus was selected and the Brunswick Unit 1 - Delco East "B" bus Control Breaker (CB) closed. By 2013 hours, the Unit

1 - Delco East transmission line had been restored and the affected Unit 1 equipment restored to operation.

At 2037 hours, the Unit 1 - Delco East off-site power source tripped a fourth time resulting in the following actuations:

A Unit 1 half Group 1 isolation

A Group 6 isolation resulting in the closure of the Unit 1 CAC valves, isolation of the Unit 1 Reactor Building Ventilation System and a Unit 1

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SGTS initiation

A Half Group 10 isolation resulting in the closure of the Unit 1 Primary Containment Pneumatic Supply Valves - Division I only

A half scram of the Unit 1 RPS logic ("A" logic channel) RWCU 1A pump trip

Unit 1 Drywell Purge isolation

The Unit 1 - Delco East off-site power source was restored through the Unit 1 - Delco East "B" bus at 2155 hours. At 2258 hours, the Unit 1 - Delco East "A" bus was restored following the replacement of a closing auxiliary relay (52X) which had failed at approximately 1957 hours and resulted in the switching of the Unit 1 - Delco East off-site power source to the Unit 1 - Delco East "B" bus. At 2337 hours, based on the return of two of four off-site Unit 1 power sources, the Unusual Event was terminated. The remaining off-site power sources supplied by the Castle Hayne East 230 KV and Jacksonville 230 KV transmission lines were restored at 1309 and 2026 hours on March 14, 1993, respectively.

#### CAUSE OF EVENT

The Unit 1 and Unit 2 ESF initiations were caused by on-site electrical system voltage fluctuations resulting from the loss of incoming off-site power sources. The voltage fluctuations caused the dropout of various control circuit relays and subsequent spurious operation of ESF equipment.

The loss of the Brunswick Unit 1 - Jacksonville, castle Hayne East, and Unit 2 - Castle Hayne West 230 KV transmission lines was due to a combination of the forces exerted by severe storm winds and the premature

degradation of two Cellon-treated wooden poles comprising the H-pole transmission line support structure #10. Inspection of the failed poles revealed that one pole had broken at the groundline and the other had broken approximately two and one-half feet above the groundline. A field inspection of the failure site revealed that the core of each of the failed poles had deteriorated.

The degraded poles were made from Douglas Fir and treated with the wood preservative, Cellon. Due to the density of Douglas Fir, Cellon may not penetrate the pole completely. Consequently, a Cellon-treated Douglas Fir pole may prematurely decay at the core of the pole, especially that part of an installed pole exposed to the moisture levels present at the groundline.

Industry accepted pole inspection techniques include visual examination and solidity testing. To test for solidity the poles are struck with a solid object such as a hammer. The failed poles were last inspected in the Spring of 1992. During that inspection the solidity test was performed and the results indicated that the pole was sound. This is due to the fact that the poles were decayed in the central core of the pole with approximately a one inch thick shell of solid external wood intact. The hard wood external shell prevented detection of the core decay.

The spurious tripping of the Unit 1 - Delco East 230 KV off-site power source is believed to have been caused by debris which was blown into the line due to the high winds. Roofing tin-type materials were discovered near the lines during the storm. Metal debris blown into the line is believed to have caused a flash over which was

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sensed by the protective relay circuitry and resulted in tripping of the associated Unit 1 - Delco East circuit breakers.

#### CORRECTIVE ACTIONS

The Unit 1 - Delco East 230 KV transmission lines have been inspected. No degradation to the line was observed which could have contributed to the loss of this line.

CP&L Transmission Line Design Engineering is reviewing the design of the cross-over points of the transmission lines emanating from the Brunswick plant. Recommended corrective actions will be initiated if needed to prevent recurrence.

The failed Cellon-treated Douglas Fir poles comprising structure #10 were

replaced with steel poles.

An inspection of the transmission support structures on each of the eight transmission lines emanating from Brunswick and located within 15 structures from the plant has been performed. Nine Cellon-treated poles were identified. Core samples of some of these nine Cellon-treated poles were taken. Although no significant decay was identified, the Cellon-treated Douglas Fir poles have been replaced with galvanized steel poles.

CP&L contracted the Osmose Company to conduct a more thorough inspection of the remaining structures supporting the eight lines emanating from the plant. This inspection identified six transmission line poles which need replacing. Four of the six poles have been replaced. The remaining two poles will be replaced pending procurement of material.

#### SAFETY ASSESSMENT

This event is of minimal safety significance in that total off-site power was not lost and the Emergency Diesel Generators operated as designed. Following each voltage transient, the affected equipment was restored to a normal lineup. During this event the Brunswick electrical distribution system functioned as designed. The protective relays functioned as required to minimize equipment damage. Proper protective device coordination precluded overtripping of equipment. The ESF functioned as designed, including the RPS and the Group Isolation signals.

#### PREVIOUS SIMILAR EVENTS

A similar event was reported in LER 2-91-16.

#### EIIS COMPONENT IDENTIFICATION

System/Component EIIS Code

Containment Atmospheric Control System IK  
Primary Containment Isolation System JM  
Reactor Protection System JD  
Reactor Water Cleanup System CE  
Standby Gas Treatment System BH  
Switchyard System FK  
Cable/Pole CBL

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SUPPLEMENTAL INFORMATION:

On March 16, 1993, a sequential Loss of Offsite Power (LOOP) event occurred. The following discussion first addresses the sequence of events which began on Unit 2 followed by those (some of which overlap) that occurred on Unit 1. A discussion of equipment failures and other problems, the cause of the LOOP, corrective actions taken and planned, and the impact on safety are also included in this section.

#### Unit 2 LOOP:

Prior to the LOOP event, the Unit 2 auxiliary power system was being supplied from the 230 KV Bus 2B through the Startup Auxiliary Transformer (SAT). The B loop of the Residual Heat Removal (RHR) system was in Shutdown Cooling (SDC).

On March 16, 1993, at 1855 hours, excessive current leakage (flashover) of the No. 2 Caswell Beach circuit switcher shunt trip insulator occurred resulting in the lockout of the 230 KV Bus 2B. Power was lost to the 4KV balance-of-plant (BOP) buses 2B, 2C, and 2D and the 4KV emergency buses E3 and E4. All four emergency diesel generators (EDG) auto started and EDGs 3 and 4 tied to their respective emergency buses. The following Engineered Safety Feature (ESF) actuations occurred: a full reactor scram, Primary Containment Isolation System (PCIS) group isolations 1, 2, 3, 4, 5, 6, 8, 10, and a Standby Gas Train system initiation. Additionally, Shutdown Cooling (SDC) was interrupted due to the closure of RHR valves and a loss of power to the 2B RHR pump (which was powered from emergency bus E4.) At 1903 hours, an Unusual Event was declared. By 1959 hours, the ESF actuations were reset and SDC restored. At 2108 hours, the Technical Support Center (TSC) was activated.

A visual inspection of the plant switchyard equipment revealed that severe flashover of electrical insulators had occurred. The flashover was caused by the coating of the insulators with a wet conducting film containing dissolved salts. The insulator contamination resulted from the effects of the March 13, 1993 storm and the misting rainfall which occurred on March 16, 1993. Restoration of power to Unit 2 through a back feed alignment was not implemented based on the general degradation of insulators throughout the switchyard. A recovery plan involving the cleaning of the switchyard insulators was coordinated by station, Transmission, and System Operations (load dispatcher) personnel. Cleaning was determined necessary because of the excessive amount of salt which accumulated on the switchyard equipment during the March 13, 1993 storm. To facilitate insulator cleaning, incoming power to the 230 KV Bus 2A was de-energized at approximately 2359 hours. Insulator cleaning was initiated at 0256 hours on March 17, 1993. Insulator cleaning was accomplished by the spraying of water and/or hand cleaning. By 0605

hours, the switchyard cleaning was complete. Clearances established to de-energize the 230 KV Bus 2A were canceled and power restored to the bus by 0829 hours. A sequential restoration and inspection process of the Unit 2 transformer switchyard culminated in restoration of the 4KV BOP buses at 1153 hours. Although restoration of offsite power to emergency buses E3 and E4 was possible at this time, EDGs 3 and 4 were left powering the emergency buses to prevent diesel carbon exhaust buildup which is known to occur during unloaded operation. (Since an EDG 3 and 4 start signal remained sealed in due to the LOOP which had occurred on Unit 1 by this time, unloaded operation of the diesels would have occurred upon restoring offsite power to emergency E3 and E4.) By 1155 hours, the 230 KV Bus 2B was restored to service and the Unusual Event isolated to Unit 1.

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#### Unit 1 LOOP:

Prior to the event, the Unit 1 station auxiliaries were being supplied from the 230 KV Bus 1A and 1B through the Unit Auxiliary Transformer (UAT). The SAT was also aligned to the 230 KV Bus 1B and feeding the plant BOP Bus Common A. The A loop of the RHR system was in SDC. The loss of the Unit 2 230 KV Bus 2B (discussed above) resulted in the interruption of Unit 1 SDC since the in-service Unit 1 RHR pump was being supplied from emergency bus E3. SDC was restored by 1934 hours on March 16, 1993.

On March 16, 1993, at 2050 hours, excessive current leakage (flashover) on the No. 1 Caswell Beach circuit switcher blade support insulator resulted in the lockout of the 230 KV Bus 1B and subsequent de-energizing of the Unit 1 SAT and Common A and B buses. Due to the 230 KV Bus 1A alignment to the UAT, Unit 1 offsite power remained intact including the supplies to the Unit 1 4KV BOP buses 1C and 1D and the 4KV emergency buses E1 and E2. The loss of the 230 KV Bus 1B resulted in on-site electrical distribution system voltage fluctuations. These voltage fluctuations resulted in a full Group 1 isolation (no valve motion occurred since the Group 1 valves were already in the closed position at the time of the event), an RPS half trip, and a Reactor Water Cleanup (RWCU) pump trip. At 2108 hours, RWCU was returned to service to provide reactor water level control. By 2325 hours, the RPS half trip and Group 1 isolation were reset. Between 0125 and 0317 hours, on March 17, 1993, the Unit 1 Delco East Feeder Power Control Breaker (PCB) 23A tripped momentarily resulting in momentary half trips to the RPS.

At approximately 0325 hours, the 230 KV Bus 1A locked out due to a flashover on a switchyard insulator resulting in a total loss of offsite

power to Unit 1, including a loss of power to the 4KV BOP buses 1C and 1D and the 4KV emergency buses E1 and E2. EDGs 1 and 2, which had been operating unloaded since the loss of offsite power to Unit 2, tied onto their respective buses. The following ESF actuations occurred: a full RPS trip and PCIS Group isolations 1, 2, 3, 4, 5, 6, 8, and 10. SDC was interrupted due to the closure of the RHR valves and the loss of power to the 1A RHR pump. ESF actuations were reset and SDC restored by 0458 hours.

To avoid possible interference between parallel work crews, the Unit 1 and Unit 2 recovery plans were performed sequentially. Following the cleaning of the Unit 2 switchyard and restoration of Unit 2 off-site power, the Unit 1 switchyard and transformer cleaning was initiated. Cleaning began at 1057 hours and was completed by 2205 hours. Offsite power was restored to the Unit 1 BOP 4KV buses by 0433 hours on March 18, 1993. The EDGs 1 and 2 were unloaded and emergency buses E1 and E2 were returned to normal power by 0612 hours. By 0616 hours, all EDGs were secured.

Cause of the LOOP:

On March 13, 1993, high winds without significant rainfall resulted in the heavy accumulation of salt on electrical insulators located in the Unit 1 and 2 switchyards and transformer yards. The salt build-up combined with misting rainfall and evening dew on March 16, 1993 and caused arcing and flashover of insulators which resulted in a sequential loss of offsite power to both units.

Equipment Failures and Other Problems Encountered:

#### A. Transformer Yard Faults and Switchyard Arcing

Heavy salt accumulation on vehicles and glass surfaces at the plant was observed

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by plant personnel following the March 13, 1993 storm. This observation was discussed on March 15, 1993, in the Morning Management Outage Meeting and an action item initiated for followup. A visual/audible walkdown inspection of the 230 KV switchyard and transformer yard was performed. With no other means or process established to detect the salt contamination, the 230 KV equipment was judged to be quieter than normal and no concerns were identified. On March 16, 1993, the results of the inspection were presented to the Morning Management Outage meeting. Subsequently,

under damp conditions off-site power was lost to Unit 2 and Unit 1.

The corrective actions taken involved the cleaning of the switchyard and transformer yard equipment and insulators. Washing of the equipment with water was deemed the appropriate process although equipment de-energization was required. Water from the fire protection system was sprayed on the equipment via fire hoses. The flashed over insulators were hand cleaned with abrasive pads. All insulators were cleaned satisfactorily and none required replacement. Cleaning was performed on all station 230 KV insulators and PCB/transformer 230 KV bushings.

An investigation into the possible methods for detecting, preventing, and correcting adverse salt conditions on the Brunswick 230 KV switchyards/transformer yards and the 230 KV transmission lines emanating from the plant has been performed. The results of this investigation determined that the Equivalent Salt Deposit Density detection system (ESDD) is the most suitable process for detection of salt accumulation on switchyard and transformer yard insulators. The ESDD detection process involves measuring the conductivity of transformer deposit samples. The measured conductivity is then converted to the equivalent salt deposit density. This value will be used to determine the need for equipment cleaning. The ESDD detection system implementation plan is currently being evaluated by plant management and the Transmission Engineering Department.

#### B. TSC Diesel Generator

On March 13, 1993, at approximately 2000 hours, the TSC diesel generator shutdown due to fuel supply problems. The resultant loss of power caused the shutdown of the TSC ventilation system. A gradual heatup of the TSC Emergency Response Facility Information System (ERFIS) computer room resulted in shutdown of the ERFIS computer. Shutdown of the TSC diesel generator also resulted in a loss of AC power to the ROLM phone system battery charger. Approximately one hour and seven minutes after AC power was lost, Node 2 of the ROLM phone system became inoperable. This resulted in the loss of the TSC phones, the Automatic Ringdown (ARD) phone circuits between the plant control room and the TSC, and the ARD circuits between the plant control room and the Skaale Energy Control Center.

The shutdown of the TSC diesel generator was due to previous changes to the diesel fuel system including the rerouting of the fuel bypass/discharge line and the installation of a fuel-line filter.

These changes resulted in restriction of fuel flow to the point that the installed fuel transfer pump was unable to satisfy the diesel's fuel demand. This condition had been recognized during a post maintenance test run of the diesel on February 26, 1993. Before a new higher capacity pump could be installed, the March 13, 1993 event occurred.

On March 18, 1993 the TSC diesel generator fuel transfer pump was replaced with a

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new fuel pump with an increased capacity. Post maintenance testing verified that the new pump is capable of maintaining fuel level in the transfer tank.

An investigation into the cause of the ROLM phone failure and the associated battery backup system capacity has been performed. This investigation included a TSC telecommunication system battery capacity test. The battery capacity test revealed that back-up battery capacity will provide adequate power for approximately one hour. To improve the reliability of TSC communications, the plant is evaluating an eight-hour rated battery system to replace the existing system.

### C. Equipment Clearance Delays

Delays in de-energizing and restoring electrical equipment were encountered during the LOOP recovery effort. These delays resulted from the inflexibility of the clearance process to allow qualified personnel other than plant operations to switch and tag appropriate equipment. Some of the Unit 1 transformer yard equipment could have been cleared more quickly by System Operations. Additionally, the BNP clearance process is more complex than the clearance process used by the Wilmington Area Transmission maintenance (WATM) crews supporting the recovery. This resulted in confusion in the communications between the control room and dispatcher.

An evaluation to determine the cause of the clearance problems encountered during the event and the associated corrective actions has been performed. As a result of the evaluation, training of all on-shift operators on the execution of the clearance process during a LOOP event including dispatcher and WATM interface processes will be performed. Additionally, clearances required to recover from a similar event will be prepared and maintained on file to be issued as needed.

#### D. Emergency Diesel Generator Observations

All EDGs performed as designed with no concerns that threatened their operability throughout the event with the following observations:

Minor field voltage fluctuations were observed on EDG No. 2 at 0510 hours on March 17, 1993. During the event, the performance of the diesel was closely monitored. Engineering and TSC personnel concluded that the fluctuations were not significant and did not impact diesel operability. Post-event testing determined the cause of the fluctuations was oxidation of the Automatic/Manual Voltage Regulator Selector Switch. The switch was cleaned prior to Unit 2 startup.

Additionally, while operating EDGs 2 and 4, the pedestal bearing high temperature alarm annunciated several times. This problem had been recognized previously and was being researched prior to the event. The setpoint for all four diesels at that time was 150 degrees Fahrenheit. A plant modification was implemented prior to startup of Unit 2 which raised the bearing temperature annunciation setpoint in accordance with vendor recommendations to 170 degrees Fahrenheit.

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#### Safety Assessment

The LOOP event is of minimal safety significance in that the site emergency power supplies performed as designed throughout the event. The electrical distribution system undervoltage relays functioned properly to separate the emergency buses for offsite power and initiate starting and loading of the EDGs. The electrical distribution system protective relays functioned as designed to minimize significant equipment damage. With both units having been in cold shutdown since April 21, 1992, decay heat load generation was extremely low. Consequently, the loss of SDC did not result in a significant increase in reactor coolant temperatures. The Engineered Safety Features functioned as designed.

#### SUPPLEMENT TWO: REVISION TO CORRECTIVE ACTION

While reviewing the methods for implementing the Equivalent Salt Deposit Density (ESDD) detection system, BNP identified concerns regarding the practical application of the system (i.e., action trigger levels and practical methods for cleaning energized components). An additional

review of other options for the solution to salt buildup on switchyard components determined that RTV silicone coating of electrical insulators would provide long term, safe, and economical protection against salt deposit buildup. Further review of approximately 40 other companies and utilities using silicone coatings confirmed that in recent years silicone coating has been applied to transmission class insulators with excellent results. BNP has disapproved the installation of the ESDD detection system and initiated a project to apply the RTV silicone coating to Units 1 and 2 transformer and switchyard insulators. Coating of the Unit 1 transformer and switchyard insulators is complete. The Unit 2 insulators will be coated during the upcoming refuel outage.

ATTACHMENT TO 9312070158 PAGE 1 OF 2

#### List of Regulatory Commitments

The following table identifies those actions committed to by Carolina Power & Light Company in this document. Any other actions discussed in the submittal represent intended or planned actions by Carolina Power & Light Company. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Manager-Regulatory Affairs at the Brunswick Nuclear Plant of any questions regarding this document or any associated regulatory commitments.

Committed  
Commitment date or  
outage

1. Apply RTV silicone coating to Unit 2 transformer and B211R1 switchyard insulators.

ATTACHMENT TO 9312070158 PAGE 2 OF 2

CP&L

Carolina Power & Light Company

Brunswick Nuclear Plant  
P. O. Box 10429  
Southport, NC 28461-0429

NOV 24 1993

SERIAL: BSEP-93-0184 10CFR50.73

U.S. Nuclear Regulatory Commission

ATTN: Document Control Desk  
Washington, D. C. 20555

BRUNSWICK NUCLEAR PLANT UNIT 1  
DOCKET NO. 50-325/LICENSE NO. DRP-71  
SUPPLEMENTAL LICENSEE EVENT REPORT 1-93-008

Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Part 50.73, Carolina Power & Light Company submits the enclosed Supplemental Licensee Event Report. The original report fulfilled the requirement for a written report within thirty (30) days of a reportable occurrence and was submitted in accordance with the format set forth in NUREG-1022, September 1983.

Please refer any questions regarding this submittal to Mr. R. C. Godley at (910) 457-2412.

Very truly yours,

J. Cowan, Plant Manager Unit 1  
Brunswick Nuclear Plant

SFT/

Enclosures

1. Supplemental Licensee Event Report
2. Summary of Commitments

cc: Mr. S. D. Ebnetter  
Mr. P. D. Milano  
Mr. R. L. Prevatte

\*\*\* END OF DOCUMENT \*\*\*

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